

# 4th IEE Symposium

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## An Introduction to Lean Manufacturing

**Bob Emiliani**

**Professor of Management & Technology  
Rensselaer Polytechnic Institute  
Lally School of Management and Technology  
<http://www.rh.edu/~emiliani>**

**Director of the  
Center for Lean Business Management  
<http://www.clbm.org>**



# Frame of Reference

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**Customer Requirements are  
Satisfied by a Network of  
Connected Services Whose  
Basic Unit is Information**

***Lean Works Wherever Information is Exchanged***



# What is Lean?

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## **DEFINITION**

**The Philosophy and Practice of Eliminating Waste  
*and Increasing Customer Value***

**Principles Apply to Every Function / Activity**

**Key Concept**



# What is Lean?

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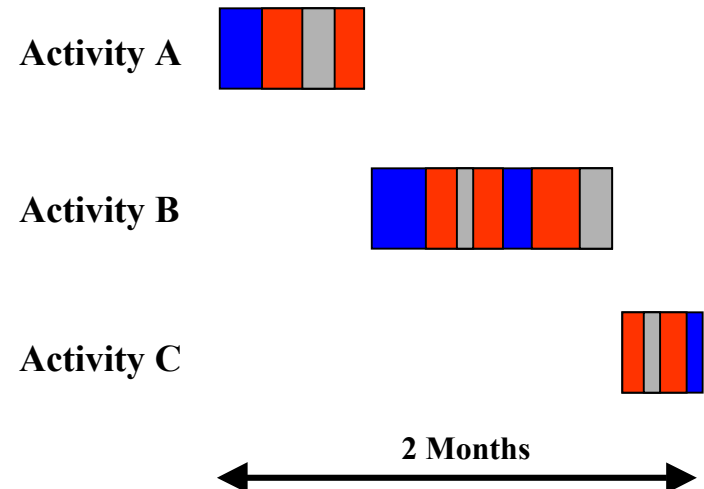
## WHAT IS WASTE?

**An Activity or Output that Adds Cost but Does Not Add Value as Perceived by the End-Use Customer**

**Key Concept**

# What is Lean?

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**Eliminating Waste Improves Responsiveness**



# What is Lean?

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## WHO IS THE END-USE CUSTOMER?

**The Customer Who Ultimately Pays For  
and Uses the Product or Service**

**Key Concept**

# What is Lean?



Mr. Taiichi Ohno

## Counterintuitive Lean (Pull) System

Reverse: <5% of Businesses

Design ← Customer

## Intuitive B&Q (Push) System

Forward: >95% of Businesses

Design .....► Customer



# What is Batch-And-Queue?

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## DEFINITION

**A Method of Producing Goods or Services in Which  
Large Quantities of Work Are Processed Before  
Moving to the Next Step**

***Producer Focus* vs. *Customer Focus***

**Key Concept**



# What is Batch-And-Queue?

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**The First Document  
Moves to the Next  
Step When the Last  
Document is Done**

**Big Batches of Work / Long Queue Times**  
**- *Illusion of Efficiency* -**

# The Seven Wastes in Production

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- Defects *Scrap/Rework*
- Transportation *Product Movement*
- Overproduction *Making More Product Than Can be Sold*
- Waiting *Operators Waiting*
- Processing *Minimize Number of Steps*
- Movement *Unnecessary Motion*
- Inventory *Money Sleeping*

**Eliminate Waste in Production!**

# Continuous Improvement in Production

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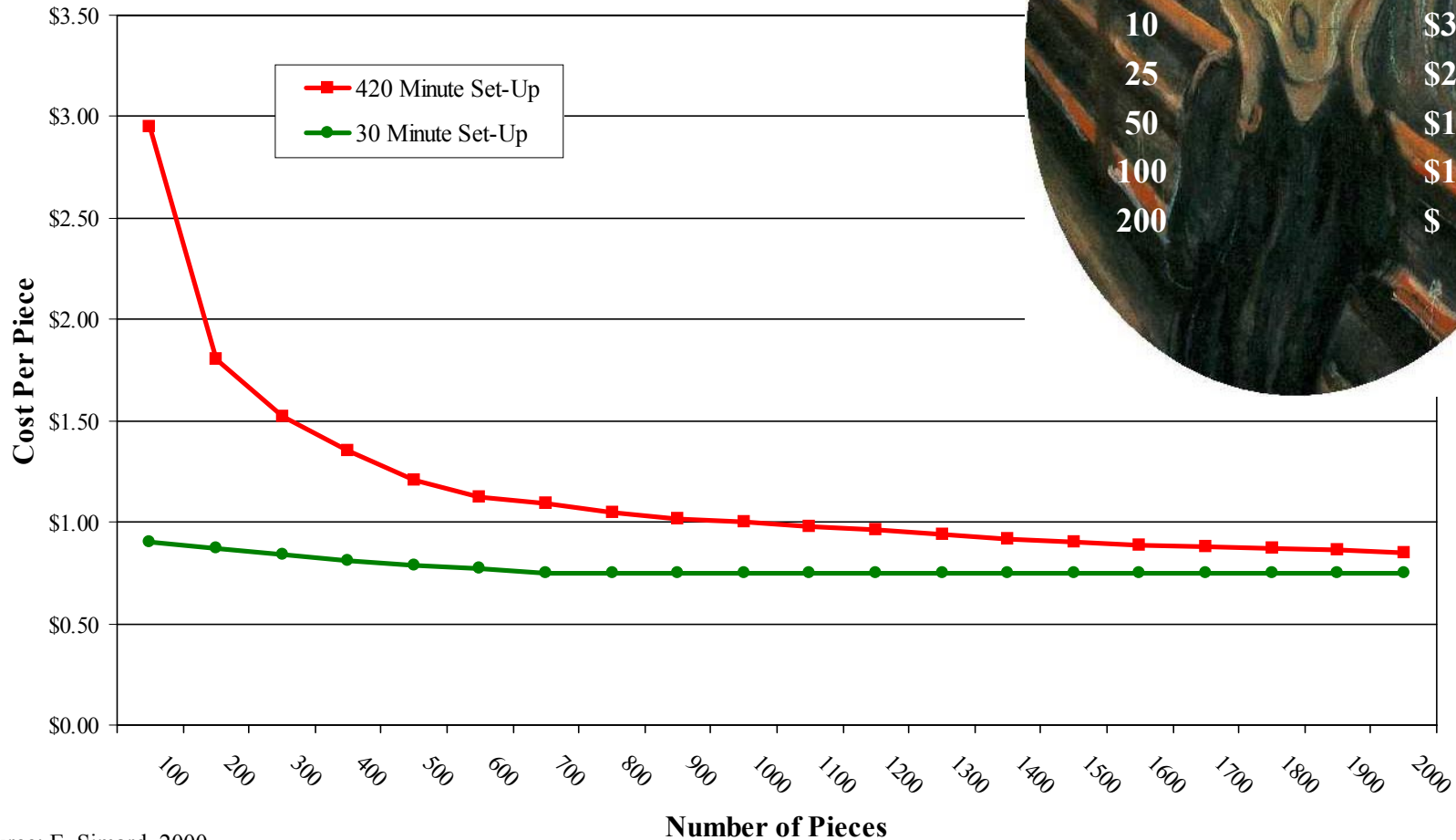
- **5S (Sort, Straighten, Shine, Standardize, Sustain)**
- **Visual Factory**
- **Total Productive Maintenance**
- **Standard Work**
- **Percent Loading**
- **Kanban**
- **Mistake Proofing**
- **Set-Up Reduction**
- **Takt Time**



**Systematic Elimination of Waste!**

# Critical Thinking

**Dependence of Part Cost on Machine Set-Up Time**



Source: E. Simard, 2000

Source: Edvard Munch, "The Scream"





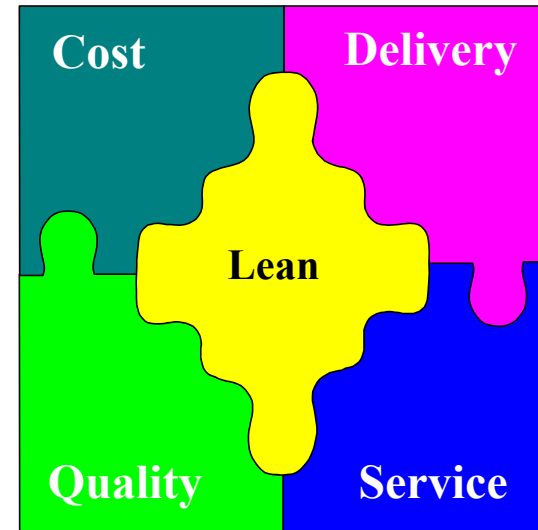
# What is Lean?

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**Optimizing the Parts**

**vs.**

**Integrating the Whole**



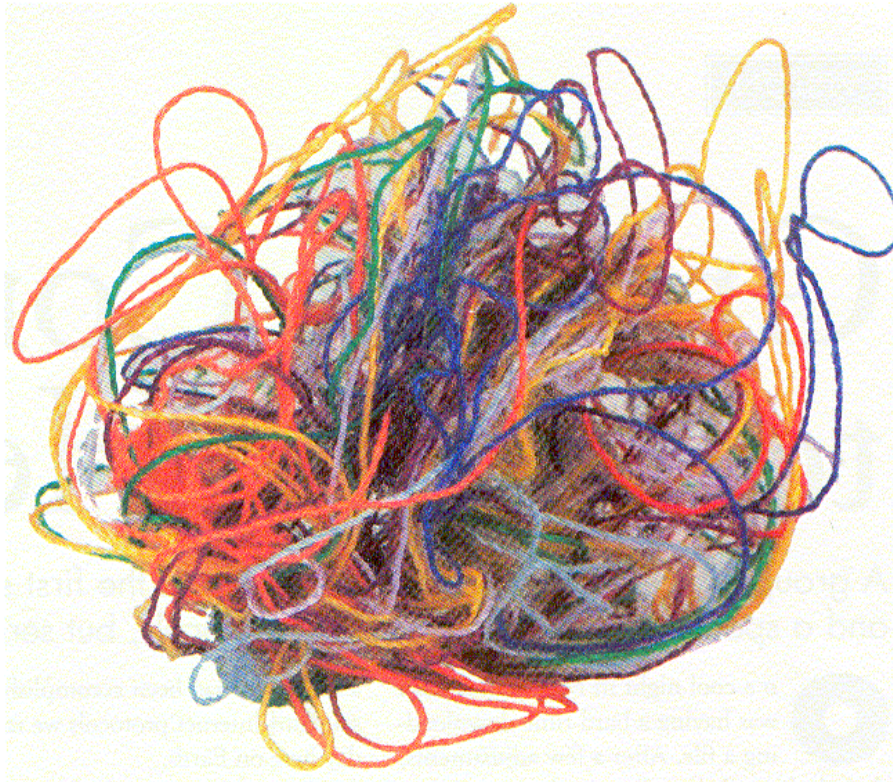
**+ Respect for Stakeholders**



# What is Lean?

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## Batch & Queue



## Lean





# Common Misconceptions

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## 1. Lean is Only for the Manufacturing Unit

- Waste Exists in All Business Processes
- Lean Applicable to Service & Support Functions

## 2. Lean is Just a “Flavor of the Month”

- It Can Become a “Flavor of the Month” if it is not Understood or Implemented Properly (Commitment + Discipline!)

## 3. Lean = Layoffs

- Don't Eliminate Jobs Due to Productivity Improvement
- Labor Reduction Through Attrition/Re-Deployment
- People are Not Waste - Business Processes Contain Waste!

# Common Misconceptions

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## **4. Lean Costs a Lot of Money to Implement**

- **Spend Ideas, Not Dollars**

## **5. Process Improvement Reduces Output**

- **Temporary Reduction in Output, but Post-Event Productivity Can Increase 50-200%**

## **6. Management Can Pick and Choose Lean Tools**

- **Partial or Selective Use Corrupts Lean**

## **7. Lean Yields Only Long-Term Results**

- **Lean Yields Short-, Mid-, and Long-Term Results**



# Common Misconceptions

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## 8. Lean Has No Margin for Error - *That's Bad!*

- **No, That's Good!**
- **Make the Problem Visible, Ugly, Determine the Root Cause, and Eliminate Repeat Occurrences**

## 9. Lean Can be Successful with High Mgmt. Turnover

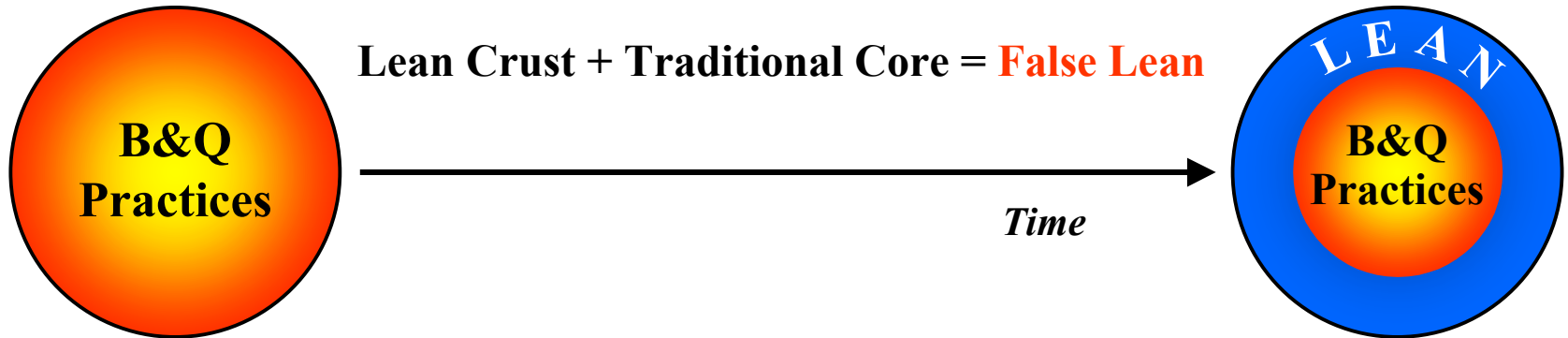
- **No! - Lean Mindset Developed Over Time**
- **High Turnover Corrupts Lean**

## 10. Lean Only Works in Japan

- **Lean Works in Mexico, Brazil, China, Germany, USA, UK, etc.**
- **Needs to be Well Understood: Commitment + Discipline**

# Flawed Transition

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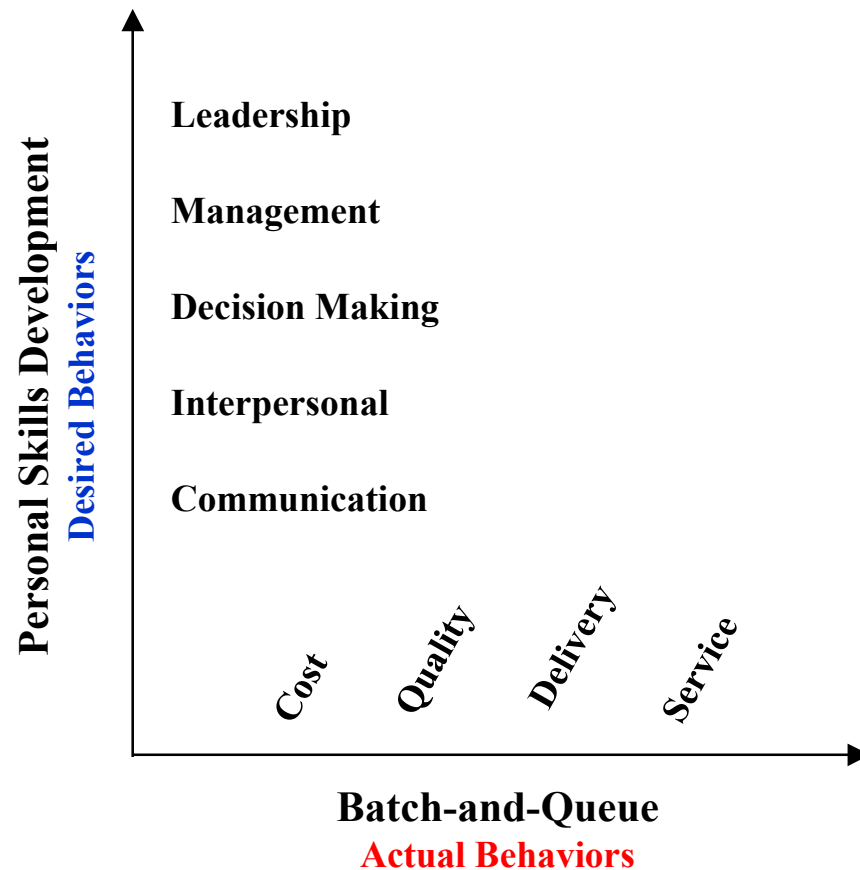


**Technical Aspects of Implementation  
are Very Important**

***Leadership Behaviors are More Important***

# Misaligned Management

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***Key Problem***

**Desired  
Behaviors  
are not  
Aligned  
with Actual  
Behaviors**

# The Eight Wastes

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- **Overproduction**
- **Waiting**
- **Transportation**
- **Processing**
- **Inventory**
- **Movement**
- **Defects**
- **Behaviors**

**Ohno - *The Classic “7 Wastes”***

**Emiliani - *The 8th Waste***

# A New Linkage

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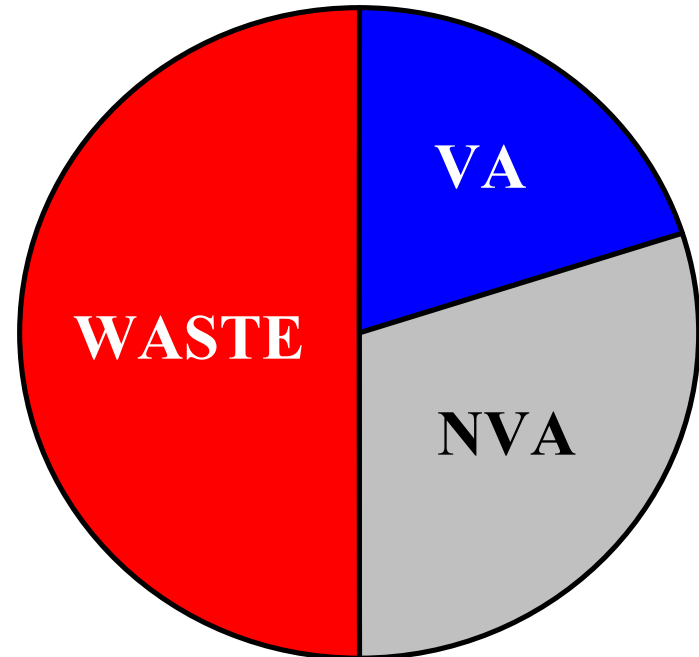


# Improving Productivity

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## Financial Problems?

**Over 50% of Employee  
Time is Waste, Driven  
by Local Optimization**



**Pay is \$100K, But Get <\$20K of Value - *Amazing!***

# Are Resources Scarce?

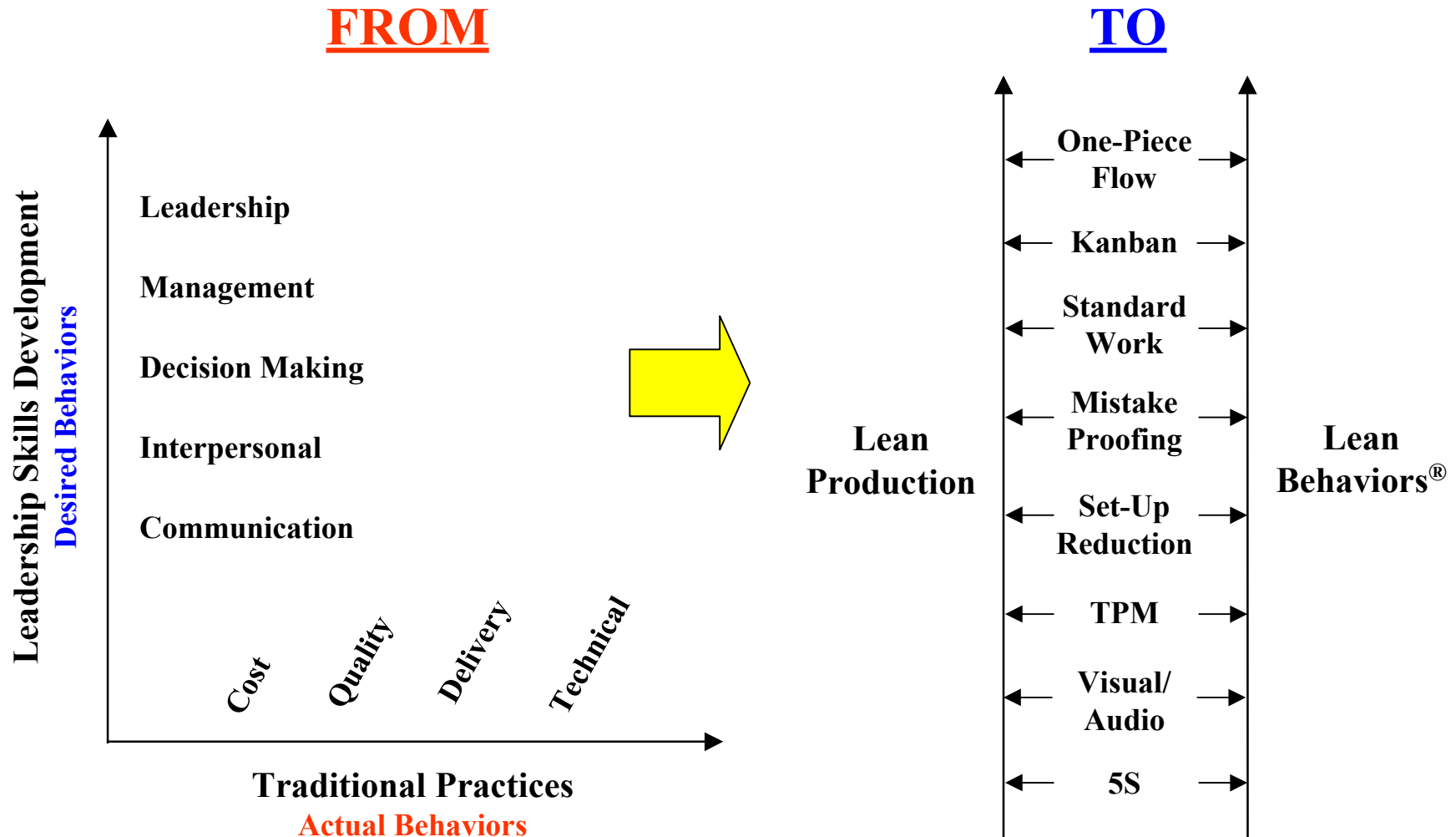
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**NO!**

*Waste is Abundant*



# Misaligned vs. Aligned





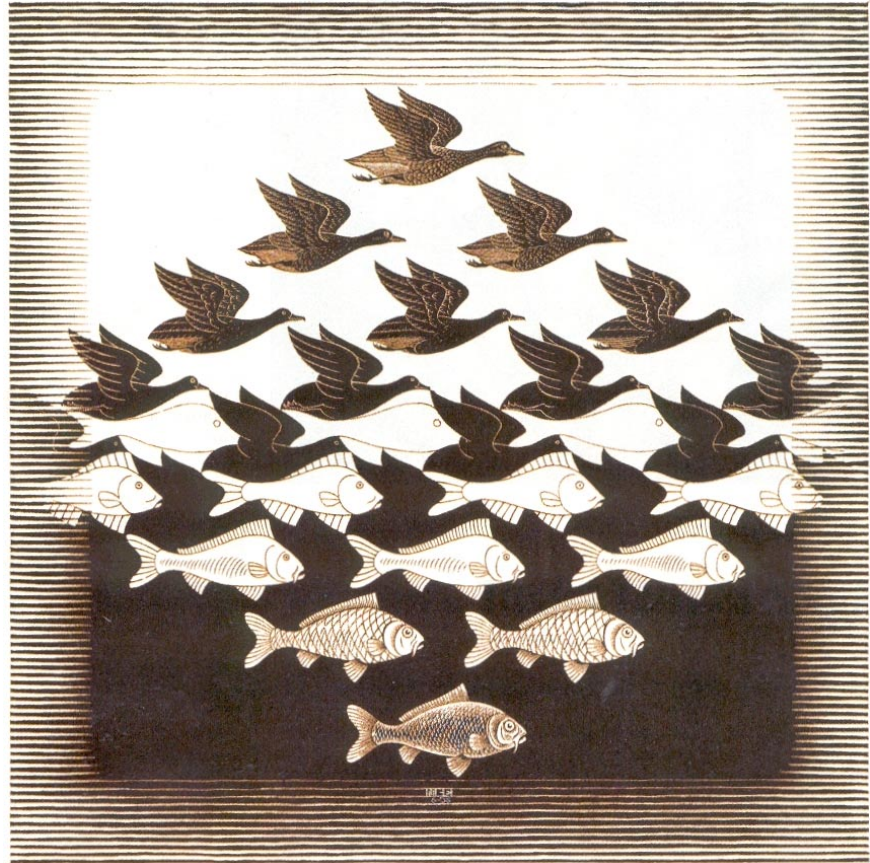
# A Comprehensive Transformation

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**LEAN**

**Where do You  
Want to Be?**

**B&Q**



Source: M.C. Escher, "Sky and Water"